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FAMILIAL PRIMARY GLAUCOMA IN ADULTS

BY

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THE influence of heredity in the incidence of primary glaucoma —apart from racial factors—has attracted little attention, and comparatively few pedigrees of glaucomatous families have been recorded. The earliest reference to familial primary glaucoma I have been able to trace is by Benedict in 1842; since then a number of writers have published pedigrees of families in which members of several generations have been affected. This familial condition appears to be quite distinct from buphthalmia.

It has long been recognised that certain races, especially the Jews, the Egyptians, and some negro races, are particularly prone to glaucoma; a similar hereditary influence can be traced among the members of certain families, and the present article is a contribution to this group.

Elliot has suggested several possible means by which the hereditary influence may act; the eye may be of small size; the development, particularly of the angle of the anterior chamber, may be defective or arrested; there may be a predisposition to nervous or vascular crises; or the conditions of environment may be in some way responsible.

Priestley Smith considered that the most important factor was probably the smallness of the eye combined with normal or excessive size of the lens, and undoubtedly a maldeveloped eye may

well be predisposed to glaucoma; yet a study of the recorded cases of familial glaucoma does not appear to lend support to this theory; there is little or no suggestion that the affected eyes were smaller than normal.

Lawford, in a discussion of the hereditary factor, did not advance any new explanation for the condition, but stressed various other points, particularly that the descent is continuous, that it shows anticipation, that it is transmitted by both sexes, and that all forms of glaucoma may occur.

Defective development of the anterior chamber angle seems to offer the most probable explanation of the mechanism of familial predisposition; it explains why these cases often show no noticeable structural abnormality, and links them up with buphthalmia and juvenile glaucoma in a continuous series.

Against this very plausible explanation, however, is the fact that familial glaucoma and buphthalmia seem very rarely to be found together in the same family—far less frequently than would be expected if the two conditions differed only in degree.

It is very difficult to assess how far emotional, nervous or vascular crises may enter into the question; such crises certainly seem to be far more frequent in certain races, and in certain individuals, than in others, but they hardly seem to provide a very satisfactory explanation of a chronic familial condition, however reasonable they may appear as exciting factors in acute glaucoma, or in precipitating an acute attack in a predisposed eye.

The study of environment opens up another interesting field of speculation, but one in which it is difficult to form any definite conclusions. The brilliant sun of the tropics, and the prevalence of conjunctival disease such as trachoma, coupled with a low standard of life, have been blamed for the prevalence of glaucoma among the Egyptians, and the association of glaucoma with epidemic dropsy implies that nutritional and constitutional factors cannot be altogether disregarded; but again these are factors of racial rather than familial significance.

The most exhaustive study of familial glaucoma was made by Bell, in the Nettleship Memorial volume of the Treasury of Human Inheritance (1932).

In an analysis of 8,569 cases of primary glaucoma, Bell found 46 per cent. were males, and in 279 cases of familial glaucoma 52 per cent. were males, a difference which is hardly significant, although other writers, quoting small numbers of cases, have inferred that male cases predominate.

An analysis of age incidence is however of special interest; Bell found that the mean age of onset for the hereditary cases was twenty years earlier than for the general series: of the hereditary cases 52 per cent. occurred before the age of thirty years, while

only 3·6 per cent. of the general series did so. These differences are too great to be explained by the suggestion that cases occurring within one family tend to be recognised earlier than would otherwise be the case.

On the other hand there is a sharp distinction from buphthalmia, where 80 per cent. of the cases are congenital or are recognised within the first year of life. These figures suggest that the determining factors in buphthalmia, hereditary glaucoma, and non-hereditary glaucoma are separate and distinct.

Further, interesting comparison may be made between the relative liability curves for glaucoma at different age periods. As far as non-hereditary cases are concerned, the liability rises steeply to a maximum at the age of 60-70 years, but the liability to hereditary glaucoma remains more or less the same throughout life; that is to say, the incidence of hereditary glaucoma is approximately the same for each decade.

Another interesting conclusion reached by Bell was that the age of onset of the disease in the parents bears a close relationship to the age of onset in the affected offspring, the children tending to become affected about 10 years earlier than the parents did. These figures are difficult to compile with accuracy, however, since the onset of glaucoma at an early age naturally prejudices marriage and parenthood, and so introduces a complicating factor; of those who develop the disease before the age of thirty relatively few become parents.

At least it can be said that there appears to be some degree of " anticipation " in subsequent generations, although the available material is too scanty for definite conclusions.

With regard to the suggestion put forward by Priestley Smith, and endorsed by Elliot, that glaucomatous patients tend to have a small eye with an unduly large lens, and that such malproportion may be the essential mechanism in the production of hereditary glaucoma, Bell found little evidence to support this view; of 25 cases in which the corneal diameter had been measured, only two were below normal size; while of 32 cases where information was given as to the depth of the anterior chamber, 21 were noted as being deep or very deep, and in 13 of these 21 cases the onset of disease was before 19 years of age. These two factors—the early age onset, and the depth of the anterior chamber—suggest that these cases may be closely linked to buphthalmia.

Bell also found, in studying the transmission of the disease, that either parent was equally potent as a transmitter, but that the parent transmitting the disease was usually himself affected; that it was extremely difficult to declare any member of an affected family safe from the disease as long as he lived, and that the cases usually appear in otherwise healthy stock with no demonstrable association with any other disease or congenital defect.

Apart from the work of Bell—primarily intended as a study in heredity—very few collections of glaucomatous families have been published within the last thirty years. P. Calhoun (quoted by Zorab) published a full account of eight cases in the Journal of the American Medical Association in 1914, including pedigrees of cases previously published by Lawford, Howe, and Nettleship. H. T. Holland published a number of Indian cases, in which three generations were involved, in the Indian Medical Gazette (1924).

Zorab (*Trans. Ophthal. Soc. U.K.*, 1932), reported seven cases in one family, again involving three generations, and reproduced the pedigrees previously published by Calhoun, Lawford, Howe and Nettleship.

He came to the conclusion that males were more frequently involved than females, in the proportion of 25 to 10 (35 cases) and he suggested that whenever two members of the same family were found to be suffering from glaucoma simplex, all the members of the family of the same and succeeding generations should be examined.

In a discussion arising out of Zorab's paper Neame quoted a pedigree from his own cases where nine members of three generations appeared to be affected, four being males, and five females.

Another reference to the subject is made by Apthomas (Fasciculus Cestriensis, 1934), who quotes two families, one showing eleven cases in two generations, and the other three cases in two generations. He again emphasises that glaucoma at an early age, or in two members of the same family, should be followed by examination of the others in the family. Apthomas agrees that a small globe, or a small cornea, is not necessarily the only cause of familial glaucoma, and that familial glaucoma is not associated with any general disease. His cases did not support the contention that the condition was commoner in the male sex, but he found that transmission might take place equally by either sex.

Two families in which glaucoma simplex appears to be a familial condition have come to my notice; one in my own practice, and brief details of the second family have been placed at my disposal by the kindness of Mr. Foster Moore.

First Family.—This is a typical Lincolnshire agricultural family, of healthy stock, which has proved comparatively easy to trace since the members of the family have all settled and lived most or all of their lives close to their birthplace.

First Generation.—Mr. H— (the grandfather) went blind at an early age; nothing is known about the reason for this, but it seems probable that he had glaucoma.

Second Generation.—Mr. H— (the father) died at the age of 61

years, and had been totally blind for 9 years when he died. I have been unable to trace any record of his condition, and it is very doubtful whether he ever obtained any medical attention for his sight. It is known, however, that he often told his wife that he would lose his sight before middle age. His wife (the mother) died aged 84 years; her sight was very good up to the age of 80 years, and nothing more is known of her. The father had several brothers and sisters; several had poor sight and some " were operated on." One sister (Millicent) went blind at the age of 19 " and was never married."

Third Generation.—At the time of his marriage both Mr. H— (father) and his wife each already had one child; both these children were presumably illegitimate. Very little is known of the father's boy, George, but his sight is said to have been quite normal. The mother's girl, Mary, died two years ago, aged over 85 years, and had " perfect sight all her life." The legitimate offspring of the marriage were, in order:

(1) John; died 34 years ago, at the age of 49. He was blind when he died, but no information is obtainable as to the cause of the blindness. He never received any treatment or attention as far as can be traced. It seems probable that he had glaucoma. He left 8 or 9 children, and it is believed that they all had good sight.

(2) Elizabeth; died in 1911, aged 53 years; from cancer. She was blind when she died, but again there is no record of the cause. She left three children, all of whom have good sight as far as is known.

(3) Harry; died two years ago aged over 70 years. He " never had good sight." 34 years ago, when he would be 38, he attended the Nottingham Eye Infirmary complaining of his sight, but his records there cannot be traced. However, his sister-in-law wrote to me to say that she knows an operation on his eyes was proposed, but he refused to have one performed. A silk cord (presumably a seton) was put into the back of his neck but he went blind subsequently in spite of this. He had nine children, of whom four are living, and all had good sight except one, who has unilateral optic atrophy following a fracture of the skull.

(4) Addie Eliza; died in 1901, aged 24 years. She had perfect sight. It may be that she died too young for the family failing to manifest itself. She left one child, which died in infancy.

(5) Charles; is still alive, aged over 70 years. Dr. Christie Reid of Nottingham has kindly sent me particulars of him. He attended the Nottingham Eye Infirmary in 1923, after having been " treated " by several opticians. He was found to have advanced glaucoma cupping and raised tension in the right eye (120, McLean's tonometer), and R.V. $\bar{c}$ glasses = 6/18. The left eye

showed a cataract, a dilated pupil and L.V. = H.M. Left tension = +3. A peripheral iridectomy was performed on the right eye, but he refused operation on the left eye. In 1929 there is a further note: " R.V. = 6/9; tension 38 (McLean): L. E. i.s.q." He has 6 or 7 children; one has defective sight, but I have no information as to the cause.

(6) Joseph; is still alive, aged 71 years, and still has good sight. He has 6 children, all of whom seem to be unaffected. One of them was recently examined by my colleague Mr. W. A. Briggs, who found unilateral post-neuritic optic atrophy, but no evidence of glaucoma.

(7) Sarah Jane; died 16 years ago, aged 53 years. Her sight failed for some years before her death, but she was never medically examined. Her story is of considerable interest, and contains strong circumstantial evidence that she suffered from glaucoma. She was " treated " by a local sight-testing optician, and used to wear sometimes two and sometimes three pairs of glasses together, which was a standing joke in the family and is still well remembered. One day while walking along one of the country roads she was nearly killed by a car which passed close beside her, which she did not see. Presumably her visual fields must have been greatly reduced by then. This incident caused some local excitement and it appears to have brought home to her how defective her sight was. The same night she committed suicide by drowning herself in the Fossdyke. She left 5 children, all of whom had good sight. One of the sons has recently been under my care for severe tobacco amblyopia, but he showed no evidence of glaucoma.

(8) Died in infancy.

(9) Edric Edwin; is still alive, aged 65 years. He attended the Lincoln County Hospital in 1935, suffering from bilateral chronic glaucoma. The right eye was trephined by Mr. W. A. Briggs, but the iris failed to prolapse at the time of operation. It prolapsed under the conjunctival flap two days later, and was abscised at a subsequent operation. Before operation R.V. = H.M. L.V. = C.F. at 2 metres. He regained 5/60 in the right eye, but the left eye became worse and he was certified as blind in 1936, the condition of both eyes being very advanced before he presented himself for treatment, and his visual fields were very small. When last seen (1937) his condition was about the same.

(10) Died in infancy.

(11) Emma Caroline; is still alive, aged over 60 years. She came under the care of Mr. T. H. Cresswell at the Lincoln County Hospital in 1924 and was then suffering from fairly early chronic glaucoma in both eyes. She was kept under observation and

treatment by miotics until 1931, when the condition of the left eye began to deteriorate, and it was accordingly trephined, with complete iridectomy. This eye has remained satisfactory ever since, and in spite of the gradual development of some central senile lens opacity in the last year or two she still sees 6/9 with a suitable correction, and her left visual field is almost full. The right eye was kept under miotics until 1937, and it was then decided to trephine this eye too. It was trephined, with peripheral iridectomy, by Mr. Cresswell, and the convalescence was normal. Three months after the operation she presented herself for examination again with a history that the sight of the right eye had suddenly failed, and she was found to have developed a large choroidal detachment in the right eye, apparently quite spontaneously. There was no history of injury or unusual exertion, and no adequate explanation for this late complication has been found. The choroidal detachment persisted, and the eye remained soft for a period of about twelve months; I was then asked to take over her treatment upon my colleague's retirement. When I first saw her, about a year after the right eye had been trephined, her condition was as follows:

R.E. white; small thin trephine bleb above, draining to some extent; cornea clear, bright, no precipitates; anterior chamber very shallow, but definitely present, with deposits of fine iris pigment scattered over the posterior surface of the cornea and the surface of the lens and the iris; iris atrophic and somewhat depigmented; small free peripheral iridectomy above; small irregular pupil with numerous posterior synechiæ; small clumps of pigment on the anterior lens capsule; a few scattered lens opacities; some vitreous opacities; large dark rounded choroidal detachments on either side obscuring most of the fundus; disc not visible. Tension = -2. R.V. corrected = 6/36 with difficulty; visual field greatly restricted above and at either side, but fairly good below.

L.E. white; small trephine bleb above, draining well; cornea clear, bright, no precipitates; anterior chamber rather shallow; normal iris; free complete iridectomy above, small dotted developmental lens opacities with some early central sclerosis; vitreous clear; fundus—early glaucoma cupping and some retinal arteriosclerosis; L.V. corrected = 6/9; tension normal.

It was difficult to know what to do for the right eye. The detachments appeared to be quite definitely choroidal from their shape, size, and dark colour; they had been present almost unchanged in appearance for just over twelve months. They were quite translucent on transillumination. Their origin was mysterious; they were certainly not present until about three months after the

original operation, when they developed, apparently spontaneously, and they had not shown any tendency to resolution. At the original operation the trephine hole had perhaps been placed rather far back, and the operation had clearly been followed by a severe post-operative iritis with an unusual depigmentation of the iris, the pigment being freely scattered through the anterior chamber. It seemed possible that the original trephine hole had only just entered the anterior chamber, and that the small aperture might have become blocked by the pigment and inflammatory deposits set free during the post-operative iritis, resulting in almost complete closure of the operative channel with preferential filtration into the suprachoroidal space.

If left alone, it seemed clear that the eye must eventually degenerate from extreme hypotony, and the visual acuity and field were already so poor that the eye was of little use. At the same time operative interference with the original trephine hole seemed to be virtually impossible, while to perform a second separate trephine would have been technically very difficult and of doubtful efficacy. Mr. Foster Moore suggested that a cautery puncture might be tried, in the hope of draining the choroidal detachments and reattaching the choroid in the scar. I performed a cautery puncture in the lower outer quadrant over the most prominent part of the choroidal detachment, and a large quantity of pale straw coloured fluid was evacuated; the detachments disappeared and the visual acuity rose to 6/18, with a considerable increase in the visual field. About two months after the operation, however, the choroidal detachment reappeared on the opposite side and the condition of the eye has slowly relapsed almost to its former state. The patient is unwilling for any further operative measures in view of her age and the condition of the left eye.

The second family.—The records of this family have been very kindly placed at my disposal by Mr. Foster Moore.*

They cover six siblings out of a family of ten; it is said by Mr. E. D. S— that there were nine living members (one having died in infancy) and that he was the only one of the nine to escape glaucoma.

(1) Miss M. L. S—; a myope of about -6·0 D. The right eye was trephined by Mr. Rutson James in 1926, and the left eye by Mr. Foster Moore in 1932. Both fields show some early nasal loss, but the corrected central visual acuity in each eye was 6/6.

(2) Miss M. S—; visual acuity R.E. 6/9; L.E. 6/18; both eyes trephined in 1932. The left field shows early nasal loss and the right eye has very little nasal field.

* A paper on this family was published in *Brit. Jl. of Ophthal.*, by R. R James. Vol. XI, p. 438, 1927.

(3) Miss U. K. S—; visual acuity 6/6 R. and L.; extensive field loss in the right eye with moderate field defect in the left eye.

(4) Mr. E. D. S—; no sign of glaucoma; said to be the only unaffected sibling.

(5) Mr. L. S—; slightly hypermetropic; visual acuity 6/6 R. and L. The right eye was trephined by Mr. Rutson James in 1926, and the left eye by Mr. Foster Moore in 1933. The left field shows early nasal loss.

(6) Miss M. S—; chronic glaucoma in both eyes; both trephined in 1925; the right visual field shows a fairly extensive defect and the left visual field is very greatly reduced.

Summary and Conclusions

A survey of the scanty literature shows that familial glaucoma—a condition distinct from buphthalmia—appears to be a definite entity although comparatively rare. All forms of glaucoma may occur in affected families, but the chronic simple type seems to be the most frequent. The condition is transmitted by both sexes, and may involve several generations. There is some tendency to " anticipation " in succeeding generations. The sexes are about equally affected, males being slightly more commonly affected than females. The mechanism by which the hereditary influence acts is unknown; defective development of the angle of the anterior chamber seems to be the most probable means, but the statistics suggest that the determining causes of buphthalmia, hereditary glaucoma, and non-hereditary glaucoma are separate and distinct. There seems to be no association between hereditary primary glaucoma and buphthalmia. There is little evidence to support the suggestion that hereditary glaucoma is due to some degree of congenital microphthalmia with a disproportionately large lens.

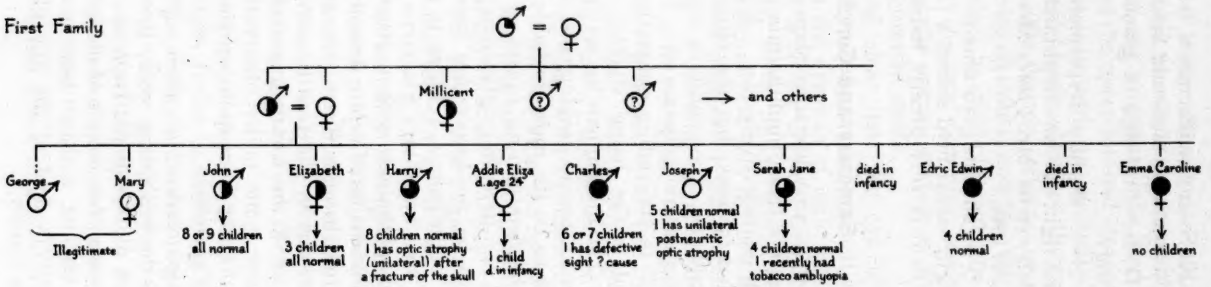
Two glaucomatous families are described. The first family was probably affected through three generations, but no cases have yet been discovered in the fourth, although, curiously enough, several members of the fourth generation have defective sight; three which have come under observation, however, have been found to be suffering from quite unrelated eye disorders and to show no sign of glaucoma.

Of the third generation, of eleven legitimate children, two died in infancy; of the remaining nine, three were certainly glaucomatous and two more suffered from eye defects which were very probably glaucoma; two more had defective sight which may have been due to glaucoma, and two were unaffected. One of the two unaffected members died at the age of 24—too young for her condition to be certain.

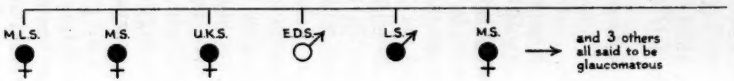
Pedigrees

- ○ No ocular defect as far as can be ascertained.
- ◔ Defective sight in adult life : cause unknown : ? glaucoma.
- ◑ Defective sight in early adult life : history suspicious of glaucoma.
- ◕ Defective sight with strong suspicion of glaucoma : proof lacking.
- ● Definitely known to be glaucomatous.

First Family



Second Family



One member of this family developed a spontaneous choroidal detachment about three months after sclero-corneal trephining, and this persisted unchanged for a year. It was (unsuccessfully) treated by a cautery puncture and is still present.

The second family comprises six siblings out of a family of ten, one of whom died in infancy. Of the nine living siblings, eight are said to be glaucomatous, and six have been examined. Of these five were glaucomatous, and one was unaffected.

The author wishes most gratefully to acknowledge the kindness and assistance rendered in the compilation of this paper by Mr. Foster Moore (London), Mr. Christie Reid (Nottingham), Mr. T. H. Cresswell (Apley), Mr. W. A. Briggs (Lincoln) and by Dr. Johnson of Bassingham, who have generously assisted in supplying records and information about their patients.

IRITIS (WHITE EYE) IN FOWLS

BY

J. E. R. McDONAGH, F.R.C.S.

With an account of the Histological Changes in the Eye

BY

EUGENE WOLFF

Introduction

IRITIS in fowls, or " white eye " as it is called, is one of the manifestations of the disease-complex which is most commonly known as " fowl paralysis." The other manifestations are paralysis, leucæmia and the development of lymphocytomata. In this paper we are chiefly concerned with the changes in the eye, as these are usually the first to occur. The iritis is more commonly associated with paralysis, which it generally precedes, than with leucæmia and the lymphocytomata. The condition is widespread and it is thought to be transmissible and to be caused by a filtrable virus. Chickens are most susceptible and the disease-complex may appear in all breeds.

Cause.—We regard the condition as being one of the sub-acute or chronic manifestations of disease which arise in fowls as a result of the activity of the pathogenic developmental or mutation forms of the *Bacillus coli communis* which have their habitat in the intestinal canal. Climate, artificial feeding, confined space, incubation, intensive breeding, etc., lower the animals' resistance,

which resides in the protein particles in the plasma. This plays into the hands of the micro-organisms which cause what we term " infections from within." The increased or pathogenic activity of these micro-organisms attracts activity from the protein particles in the plasma with the result that those which escape being sent into true solution agglutinate, increase in size and eventually become precipitated. The enlarged or hydrated protein particles are precipitated for the most part in the peri-vascular lymphatic vessels in the systemic system, as opposed to the portal and pulmonary systems. When the systemic system is involved in animals the manifestations are more generalised than is the case in man and the eyes are more frequently affected. The greater generalisation of disease in animals is probably to be explained by their falling victims less often to minor ailments than man and to being dosed with fewer drugs. A possible explanation for the eye being more frequently attacked is the greater depth of the anterior chamber allowing the entrance of more lymph and thus a greater number of the hydrated protein particles which are directly responsible for the lesions produced. These hydrated protein particles cause the lesions by attracting activity from the cells of the tissues and organs with which they come into contact, and, to make good the loss sustained the host brings up his second line of defence which are the leucocytes. The first leucocytes to be advanced are the polymorpho-nuclear variety and then the mono-nuclear type which develop eventually into plasma cells. The condition is not ordinarily transmissible, and, the explanation for many animals being attacked about the same time is that the primary invaders are operative over the areas affected. To-day the condition is so common that cases can be found any day of the year and almost on any farm. The lesions are not caused by ultra-microscopic viruses, although these may be formed from the hydrated protein particles by passing them through a filter. The young of all animals and man are more susceptible than adults to the activity of the developmental forms of the *Bacillus coli communis*, when they become active first, since with each succeeding exhibition of activity a greater degree of immunity is established against the invaders.

Symptoms.—The colour of the iris changes to varying shades of grey, first in one eye and then in the other. *Synechiæ* form, the pupil becomes contracted and finally obliterated and the animal is rendered blind. No other changes but those in the eye may be noticed, and they may exist some time before paralysis sets in in either a wing or a leg. As a rule the legs are affected before the wings.

Blood Changes.—In cases of iritis no changes in the leucocytes are to be observed. The changes do not occur until paralysis

appears and then as a rule only when the condition is acute and severe. In these cases the granular form of the polymorpho-nuclear variety is increased at the expense of the rod variety and of the mono-nuclear leucocytes. When leucæmia supervenes the mono-nuclear leucocytes increase at the expense of the poly-morpho-nuclear leucocytes and different types of leucæmia, according to the variety of the leucocyte which is advanced, may be found. Three types of leucæmia are generally described, erythro-leucæmia, lymphatic leucæmia and myeloid leucæmia. In the last two types, which may be both leucæmic and aleucæmic, especially in the former, growths commonly appear some of which are not to be differentiated from sarcomata.

Pathological Changes

(*a*) The Eye Changes

The affected animals, as well as normal controls, were killed, the heads cut off and fixed in formalin (10 per cent.), Zenker's solution and absolute alcohol. After fixing, the eyes were removed, decalcified, and following passage through the alcohols, were embedded in paraffin or celloidin. When the fat content, especially of the iris muscle, was to be investigated the embedding

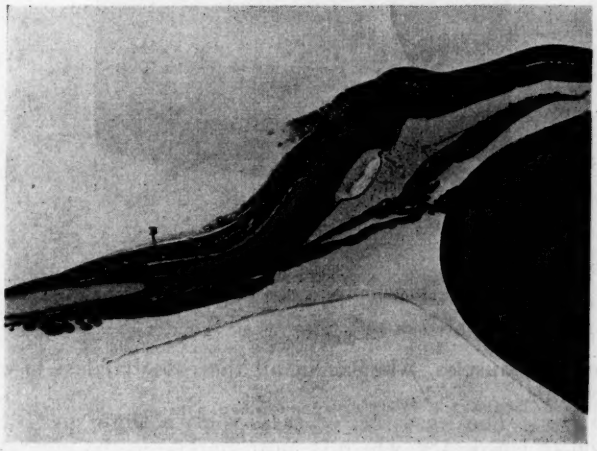


FIG. 1.

Normal fowl's eye. Antero-posterior section. Note especially the normal adhesion of the ciliary process to the lens pad, which largely takes the place of our suspensory ligament; the large canal of Schlemm and the bone (B) and cartilage in the sclera.

was done in gelatin and sections were cut with the freezing microtome. The sections were stained with hæmatoxylin and eosin, Mallory's phosphomolybdic acid, Sudan iii and Pappenheim's stain for the detection of plasma cells. In some of the specimens examined changes were found in every portion of the eye where capillary vessels are normally present, and even in the

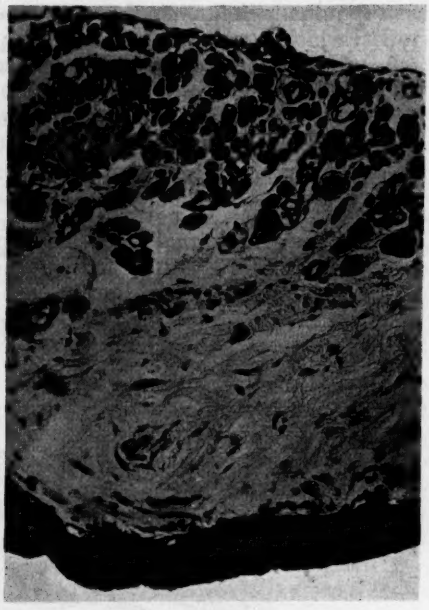


FIG. 2.

A portion of the iris showing an early case of iritis. There is slight infiltration of cells mainly in the anterior sphincter bearing portion.

extra-ocular muscles, whereas in all the essential lesion was an irido-cyclitis.

The Iris.—The least affected cases show a slight peri-vascular invasion of leucocytes, which is most marked in the anterior part of the iris which contains the striped sphincter pupillae muscle. As the severity of the infection increases this anterior zone is found to become densely infiltrated while the posterior zone is only slightly affected (Fig. 2). In the most severe cases the iris is observed to become so densely infiltrated as to make it difficult

to describe its structure. In these specimens the iris is greatly thickened. The pigment epithelium swells and degenerates as the severity of the iritis increases (Fig. 3). The pigment particles agglutinate into balls which wander into the iris tissue, or into

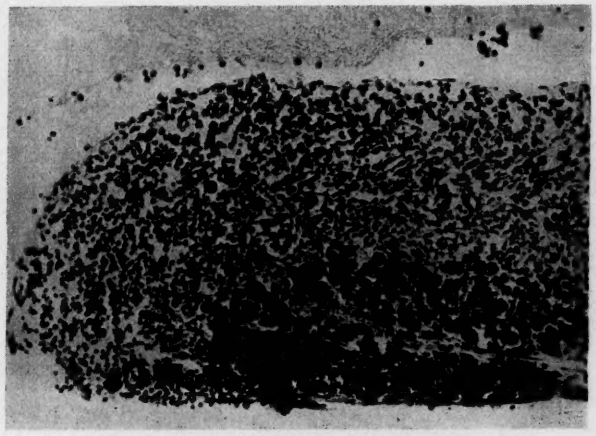


FIG. 3.

Severely affected pupillary portion of iris. The iris is densely infiltrated with cells which obscure its structure. The pigment is rolled into balls. There are exudate and cells in the anterior chamber.

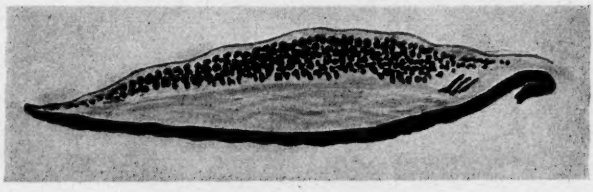


FIG. 4.

The normal iris of a fowl stained with Sudan iii to show the fat which is normally present in the fibres of the sphincter pupillae.

the posterior chamber. One of the most remarkable features about the condition is the disappearance of the normal fat of the iris (Fig. 4). The yellow colour of the eye of the fowl is due to a doubly refracting oily fat which is present in the muscle fibres of the sphincter. The fat stains red with Sudan iii, and violet with

Nile blue. The disappearance of the fat may be the result of the dehydrator or katabolic action of the hydrated protein particles which are precipitated *in loco* or may be carried away by leucocytes. According to Jaensch and Lerche the first change is a loss of the doubly refracting property, when the fat continues to stain with Sudan iii but fails to do so with Nile blue. Later when the fat has vanished there is nothing left to stain with Sudan iii. The changing of the colour of the iris from yellow to grey is

FIG. 5.

Slight infiltration of cells among the striped ciliary muscle fibres.

due in part to the cellular infiltration of the structure and in part to the disappearance of the fat. The extra-ocular fat is not affected.

The Ciliary Body.—This structure and its processes are less affected than the iris. The ciliary processes are infiltrated with a varying number of leucocytes, the vessels are dilated and the whole structure is thickened. The cells may wander into the circumlental space through gaps in the pigment epithelium which swells, becomes depigmented and finally vanishes. A migration of cells and pigment from the area which corresponds to the *pars plana* in man into the vitreous may occur. And, when this happens a fine network of connective tissue is formed. In the severe cases leucocytes invade the fibres of Crampton's and Muller's muscles (Fig. 5). The changes in the ciliary body usually terminate at the *ora serrata*, but they may extend further back.

The Anterior Chamber.—This space is filled with plasma which contains a varying number of leucocytes. As the leucocytes increase deposits (k.p.) are formed on the back of the cornea. Exudation into the pupil causes posterior *synechiæ*. Cells are found early clothing the fibres of the *ligamentum pectinatum* and these increase *pari passu* with the extension of the inflammation.

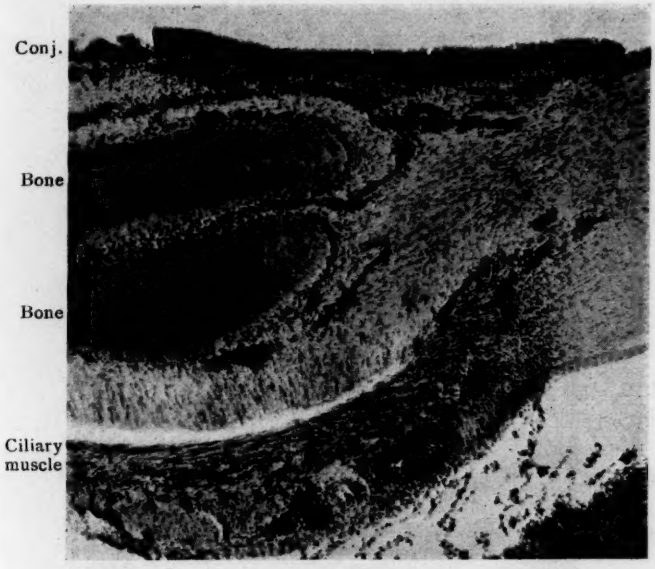


FIG. 6.

Corneo-scleral junction. There is infiltration of the conjunctiva, subconjunctival vessels, ciliary muscle, canal of Schlemm and *ligamentum pectinatum*, and iris.

The Canal of Schlemm.—This space in fowls is much larger than in man. Cells infiltrate the walls to the extent of producing wart-like masses which project into the canal (Fig. 6).

The Choroid.—This structure is little affected. The vessels are dilated, but not abnormally so, and they may be filled with red blood-corpuscles, which being nucleated, are apt to be mistaken at first sight for leucocytes. Some observers have made this mistake and have described the choroid as being infiltrated with leucocytes. Evidence may be found of peri-vascular infiltration and in the severe cases, when the *choriocapillaris* is involved, the cells of the pigment epithelium are affected. The cells swell, the pigment

shows signs of wandering and the place of the former may be taken by inflammatory cells from the choroid. In these cases the rods and cones may be destroyed and the retina may become invaded by cells and pigment.

The Retina.—This structure in the fowl, which contains no bloodvessels, may be affected secondarily to the choroid, but it is never attacked primarily (Fig. 7). The papilla and pecten may

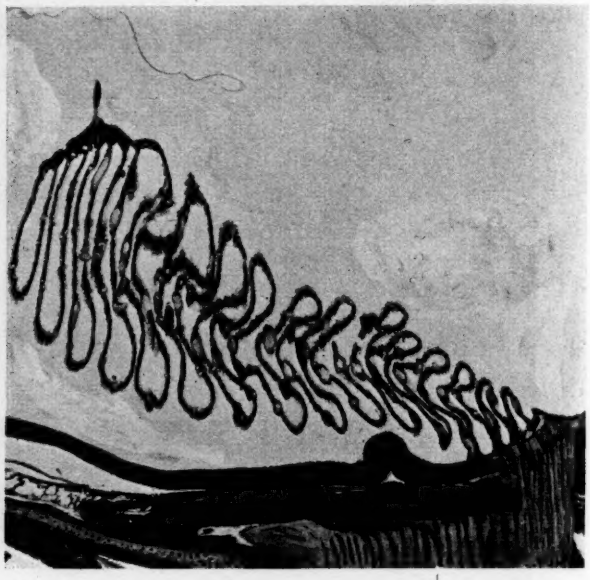


FIG. 7.

The normal pecten.

be infiltrated with leucocytes. And, when the latter is involved in this way it resembles the ciliary processes. The optic nerve is generally affected (Fig. 8). The vessels in the septa are infiltrated and the endothelial cells contain a nucleus which appears to be poor in chromatin. The nerve fibres, unlike those of the peripheral nerves, escape. Nerve changes are to be seen in the whole of the medullated portion of the optic nerve and are especially marked at the chiasma.

The cells comprised in the infiltration can be separated into three types: plasma cells, lymphocytes and endothelioid cells.

FIG. 8.

The pecten in fowl paralysis. The vessels are filled with normal nucleated red cells; but around these and in the vitreous are inflammatory cells. There is also some infiltration of the nerve head.

The plasma cells which are recognised by their eccentric cartwheel nucleus staining with methyl green and their cytoplasm with pyronin in Pappenheim's method of staining, are by far the most numerous. The plasma cells evolve from the lymphocytes which are too well known to need description. The endothelioid cells, characterised by an indefinite cytoplasm and a large feebly-staining nucleus, are probably young connective tissue cells. Jaensch and Lerche admit to finding eosinophile cells which give the appearance of sympathetic ophthalmia in man.

(β) The Nerve and Other Changes

The nerve stems and their branches are swollen and infiltrated with leucocytes. The changes are generally asymmetrical and may be limited to one side of the body. The part of the nerve adjacent to the spinal cord is usually the part which is most

severely affected, but the pathological changes cease abruptly at the point where the fibres enter the cord. The meninges are generally involved and peri-vascular changes may be found in the cord. The brain is less frequently attacked. The tumour-like masses which are to be found in the ovaries, liver, spleen, kidneys, lungs, mesentery, gizzard, pancreas, muscles and skin are of the nature of what we have called " lymphocytomata." These swellings are composed of cells of the mono-nuclear variety and of their parent cells the endothelial cells, different types of cells are to be found and the swellings range from innocent to malignant growths.

Relationship between Fowl Paralysis and the corresponding manifestations of Disease in Man

The irido-cyclitis which occurs in fowls is not to be differentiated from the manifestation of disease which appears in man as a symptom of intestinal toxæmia. It may similarly be associated with lesions in the spinal cord, more rarely in the brain and with anæmia which is usually of the pernicious type. This form of irido-cyclitis is not to be differentiated from the type which is found most frequently in a gonococcal infection where rheumatism is another most common symptom. The gonococcal irido-cyclitis is caused by the protein particles which have been hydrated by the activity of the gonococcus and not by the presence of the micro-organisms in the eye. It is interesting to note that the gonococcus belongs to the *Neisseriæ,* which have developed from Friedländer's bacillus, which with the *Bacillus acidi lactici* are the most active micro-organisms in the intestinal tract of fowls suffering with irido-cyclitis. There is no fundamental difference between the leucæmias and the various forms of lymphocytomata in fowls and those which are found in man.

Prevention and Treatment

Fowl paralysis is best prevented by keeping poultry under the best conditions possible and feeding them naturally. The ground upon which the birds live should frequently be changed and it should be green. The animals should not be overfed and all artificial foods should be avoided. Eggs and chicks should not be incubated and excessive in-breeding and egg-laying should be done away with. Provided treatment is begun early, and the most efficacious remedy is Banifex which is prepared from the micro-organisms isolated from the excreta, the animals recover, the irido-cyclitis disappears and the eye becomes normally

pigmented once more. Banifex contains the washings of an emulsion of micro-organisms which have been collected from as many birds as possible in different areas and over a period of a few years. The emulsion from which the washings are made contains 1000 million micro-organisms per c.cm. Two injections made intra-muscularly on consecutive days give the best results. Once the nerves become involved, leucæmia appears or tumours form, treatment is unavailing. Anahæmin has not given in my hands the results in fowls obtained in man, but this may be due to my not having treated the cases which are best suited to this remedy. Whether vitamin E, which contains α- and β-tocopherol, is able to disperse the hydrated protein particles as some have alleged, I am unable at present to decide.

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NOTE ON PHLYCTENULAR OPHTHALMIA

BY

SIR JAMES BARRETT, K.B.E.

MELBOURNE

THE discussion on phlyctenular ophthalmia calls for some comment. It was in Southern Australia some time ago a very common condition, and after much experience I came to regard it as a deficiency disease. It was frequently seen in girls whose diet consisted largely of tea and bread and butter. With a full diet and the usual local treatment it disappeared. It is now in private practice almost a curiosity.

But the evidence adduced by Dr. Sorsby and others re-opens the question.

Tuberculous disease in Victoria has been greatly lessened though it is still unpleasantly frequent. The hypothesis is obviously that if a phlyctenular ophthalmia case gives a positive tubercular result tubercle is to be regarded as the cause.

The lessening of tuberculous disease may be due to better conditions and greater care taken to avoid infection, but it may also be the expression of a biological process of elimination. Furthermore if the current view is taken both tubercle and

phlyctenular ophthalmia may be due to malnutrition and may not be directly associated. However, in order that the statement of the case may be complete I append a report by Dr. Bell Ferguson, State Director of Tuberculosis, in Victoria, who writes as follows:—

"In reply to your query I beg to submit the figures for the last 20 years—death rate per million.

At the present time we have on the books of this Chest Clinic the following eye cases:

Phlyctenular conjunctivitis	4
Sclerosing keratitis	1
Iridocyclitis	1
Eales' disease...	2
Interstitial keratitis	1

Of these nine cases six have demonstrable tubercle of the lung.

In my experience these ophthalmic cases of tuberculous origin are exceedingly hyper-sensitive to tuberculin. We are accustomed to using tuberculin in low dilution and with great caution over a prolonged period with a view to reducing this allergy, and taking the greatest care to avoid, if possible, or to produce only the most minimal focal reactions in the eye.

The response to tuberculin, indeed, may be regarded as definitely deciding whether the eye condition under consideration is tuberculous or not. Tubercle should be remembered as a possible cause of many obscure diseases of the eye and judicial use of tuberculin as outlined above will help to substantiate the diagnosis.

The cases have been sent from the Eye and Ear Hospital with the exception of one (Phlyctenules) occurring during pneumothorax treatment at a sanatorium.

We use the response to tuberculin treatment as a test in these eye cases commencing usually with a mild bovine tuberculin such as P.T.O. (Bayer) initial dose ·000,000,002 c.c. and doubling the dose until some reaction appears."

It will be, therefore, obvious that though the decline in the quantity of tuberculous disease has been great much still exists. But phlyctenular disease has declined to a much greater extent as already indicated.

Two questions arise in mind as in other eye diseases. (1) Is the fact that phlyctenular and other ophthalmic cases give a tuberculin reaction a certain indication that the cause is tuberculous? (2) May not both tubercle and phlyctenular ophthalmia be alike products of malnutrition.

Tuberculosis death rate over last 21 years per 1,000,000

Year	Respiratory	Other Forms	Both
1908–1912	855	182	1037
1921	667	137	804
1922	565	120	685
1923	620	123	743
1924	585	127	712
1925	561	97	658
1926	545	84	629
1927	546	100	646
1928	581	82	663
1929	496	92	588
1930	493	97	595
1931	481	68	549
1932	450	76	526
1933	405	66	471
1934	411	74	485
1935	414	64	478
1936	412	59	471
1937	384	51	435
1938	—	—	—

RESECTION OF ANTERIOR STAPHYLOMA OF THE CORNEA BY MEANS OF GRADUAL INCISIONS

BY

N. I. SHIMKIN

HAIFA, PALESTINE

ANTERIOR staphyloma of the cornea in European countries is more rare than in sub-tropical ones, such as Palestine.

Epidemics of acute conjunctivitis, especially during the dry and hot seasons of the year, aided by the exceedingly widespread trachoma, lead to frequent ulceration of the cornea which is one of the main causes of blindness among the population of Palestine. (Strathearn, Shimkin, Ticho.)

Therefore, corneal staphyloma in various forms and dimensions is often met with in this country, although less than formerly, thanks to the Palestinian Government having built good roads and convenient ways of communication which enable the patient quickly to apply to an eye-surgeon for special treatment.

The Arabic peasant population (Fellaheen) consult an oculist about an anterior staphyloma of the cornea either when it has reached such a size that it is not covered by the lids, or when the apex of such a staphyloma, exposed to the influence of the wind and dust, has become ulcerated and causes the patient insupportable pain.

Usually these patients ask the eye surgeon whether he can keep the eye-ball intact. The offer to enucleate or eviscerate the eye-ball is definitely rejected by these patients. Their opinion is that a man possessing an eye with an anterior staphyloma is still " a man like the others," while a man without an eye-ball is a cripple. Besides, many peasants point out with a reason that it is difficult to work in a field with an artificial eye, especially during the hot time of the year, and the artificial eye may break, necessitating further expenses to replace it.

Along with the cultural progress and the economic improvement of the situation of the Arabic peasantry in Palestine, this prejudice against enucleation or evisceration of the eye, is gradually disappearing. However, in countries infected with trachoma and suffering also from different forms of acute conjunctivitis, the anterior staphyloma of the cornea, needing operation, will still be met with for a long time.

All operations for anterior staphyloma of the cornea, described in handbooks of eye-surgery, differ from each other only in the method of inserting sutures in the margins of the wound after the resection of the anterior staphyloma. But in all these methods the resected part of the corneal staphyloma is removed in one stroke, and the borders of the ensuing large and widely open wound are drawn together by means of sutures, inserted beforehand, and lying either under the conjunctiva or in the tissue of wound margin.

The most frequent complication following this method of operation is loss of vitreous. The larger the segment of the resected anterior staphyloma, the bigger is the opening of the wound, and the greater is the danger of losing vitreous. This danger is increased by the fact that the vitreous humour in large and old staphylomata is usually strongly liquefied, and flows out like water from the distended eye ball. Certainly a small loss of vitreous is restored, but sometimes its loss is so great that the operation for the staphyloma has to be followed by an evisceration

of the eye-ball, *i.e.* by the very operation which the patient has not consented to.

In order to avoid this complication, namely, the great loss of vitreous humour, I suggest the following method of operation on anterior corneal staphyloma. This method was applied in 31 cases on out-patients of my clinic during the 18 years of practising eye-surgery in Palestine.

The essence of this method consists in this, that the anterior staphyloma of the cornea of whatever size, is resected not at once but by gradual incisions, each 1½-2 mm. wide. The margins of each incision are immediately drawn together by sutures. The execution of the operation is so simple that it may be performed on out-patients without the aid of an assistant.

Instruments required: An eye speculum, fixation forceps, a sharp-pointed scalpel, blunt-pointed eye scissors, 7-8 silk threads with curved needles, a needle-holder, a 2 c.c. syringe with medium size needle.

Anaesthesia.—Retrobulbar injection of 2 c.c. novocaine 2 per cent. + adrenalin, akinesia of the lids by means of the same solution and a subconjunctival injection of 1 c.c. of the same solution in the region of the ciliary body; instillation of drops of 5 per cent. cocaine three times, 2 drops every 3 minutes. Usually by the end of the instillation a total anaesthesia of the eye-ball and a total akinesia of the lids have occurred.

The Operation

Step I.—(*a*) The lids are widely opened by means of the eye speculum. If adhesions of the conjunctiva of the lid with the eye-ball are present, they are cut with scissors and then the eye-ball is quite free from any tension, and does not suffer any pressure from the eye speculum.

(*b*) Boundaries of the part of staphyloma to be resected, are outlined by means of the sharp point of the scalpel. This part has usually an ovoid form. The long axis of this ovoid lies horizontal, the outer and inner margins of the ovoid must be ¼ mm. distant from the neighbouring sclera (*Fig. I*).

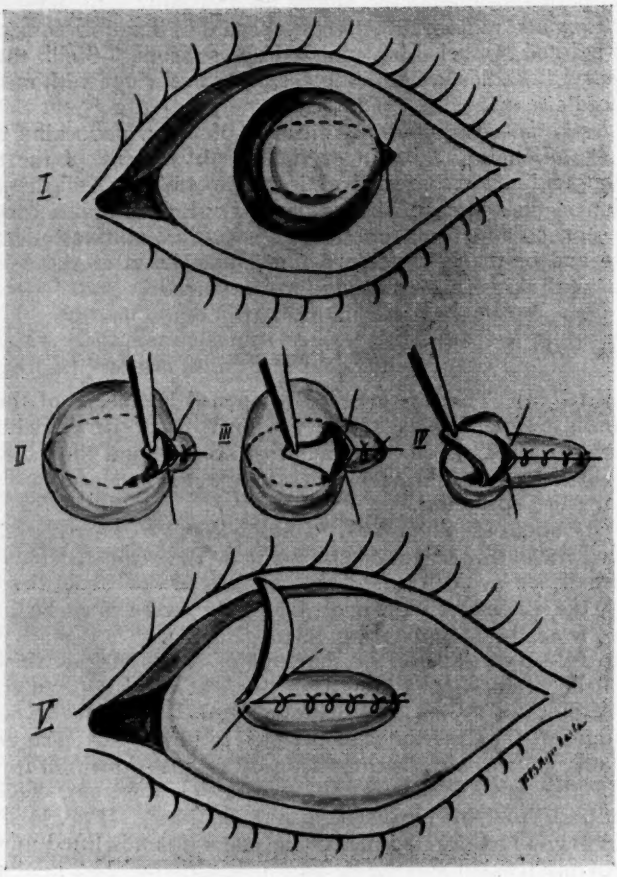
Step II.—By means of the sharp point of the scalpel, the outer end of the ovoid is cut through on the lower and upper margins, for a distance of 1½ mm. from its outer end. Through this wound the liquid of the anterior chamber slowly flows out. The end of the ovoid, cut through, is caught up by means of fixation forceps, and in the lips of the wound a suture is inserted, which is immediately tied by means of a surgical knot. (Fig. II).

Step III.—The resected part of the staphyloma is lifted upwards without any tension and the incision is lengthened 1½-2 mm. along

the outlined boundary; the lips of the wound are immediately sewn together by means of a suture which is tied with a surgical knot. (Figs. II and III).

Step IV, V, VI, VII.—These steps are a repetition of Step III, *i.e.*, the resected part of the staphyloma is lifted upwards with fixation forceps without any tension, and each time the incision is lengthened 1½-2 mm. inwards, both above and below.

After each incision, a suture is immediately inserted in the lips of the wound, and tied by means of a surgical knot. (Figs. III and IV).



Step VIII.—After the 6 sutures have been inserted, the staphyloma, now resected almost completely, is drawn with forceps upwards, and the last suture is inserted through the lips of the remaining wound at the extreme inner border of the ovoid; then the resected staphyloma is cut away altogether, and the suture is tied with a surgical knot. (Fig. V).

The ends of the threads are cut away not too short with scissors, and the sutures are painted over with iodine; 5 per cent., xeroform ointment is put in and both eyes are bandaged for 48 hours.

Usually, 7 sutures are inserted but if the anterior staphyloma is very big, 8 sutures are needed.

Post-operative Treatment.—Immediately after the operation, the patient is sent home. (All the cases operated on were on out-patients.)

The first bandage is changed after 48 hours. The eye is washed with 2 per cent. solution boric acid, 5 per cent. cocaine is instilled, and 5 per cent. xeroform ointment put in; a bandage is applied to both eyes for another 48 hours. The sutures are removed on the 5th day. Before removing the sutures, a thorough anaesthesia of the eye should be made by means of instillation 5 per cent. cocaine. If the anaesthesia of the eye is not sufficient the patient may suddenly jerk his head backwards while the sutures are being caught by the forceps, the suture may tear the cornea, and the wound margins in that place may separate. This complication does not lead to serious consequences but the post-operative treatment is lengthened by several days until the lips of the wound grow together again.

After the sutures have been removed, only a bandage is applied to the eye operated on. Usually, after 7-8 days, the patient is cured. The eye-ball retains its usual form, and is well covered by the lids; the upper lid does not fall inside and backwards, as occurs after an enucleation of the eye-ball.

For a successful issue of the operation, it is essential that the curved needles should be sharp-pointed, in order to pass easily through the thickness of the cornea, without effecting any tension on the eye-ball walls; the needle-holder should open easily so that no concussion of the eye-ball walls is made while the lock is opened.

In the operation for conical staphyloma of the cornea, where the walls are very thin, it is advisable when sewing the lips of the wound, that the needle passes through all of the thinned wall, 2-1½ mm. away from its border. When excising staphyloma with thick sclerotic walls, the needle is made to pass in the thickness of the wall 1 mm. away from its border.

The insertion of sutures is made easier if, when lifting up the resected part of the staphyloma by means of the forceps, the

surgeon simultaneously slightly lifts up the lips of the wound margins also. This enables the surgeon to see at what distance from the margin of the lips of the wound the needle enters, and also, whether the stitch lies in the thickness of tissue, or passes through it. The surgeon also sees how thickly, in certain cases of staphyloma, the back (inside) surface of its wall is covered by the distended and atrophied iris, and he may easily avoid wounding the still remaining part of the iris. The surgeon may still easily avoid wounding the lens which lies much lower than the wound margins, which are being sewn together. But the major convenience of this operation of resection of anterior staphyloma by means of incision consists in that, that the area of the open wound in the eye-ball is always very small; the wound margins are at a distance of 1½-2 mm. from each other; when bringing together the lips of the wound by means of a suture, the walls of the eye-ball do not suffer any tension and therefore the danger of losing the vitreous is reduced to a minimum.

The writer desires to point out that he does not remove the lens as is required with other methods of staphyloma operations, and has never seen any bad consequences. On the contrary, he considers that the lens in a capsule strengthened by the ligament of Zinn acts as a closed diaphragm, preventing the vitreous humour from flowing out. Besides, in anterior staphyloma, which has developed in childhood, the lens is usually missing, and therefore there is nothing to remove.

Summary

The author suggests performing resection of anterior staphyloma of the cornea by means of gradual incisions 1½-2 mm. wide each. The lips of the open wound of eye-ball are immediately sewn together after each incision. Thanks to this method, the danger of loss of vitreous is minimized. By this method of staphyloma resection the lens is not removed. The author has operated by this method on 31 cases of anterior staphyloma on his out-patients during 18 years, with quite satisfactory results. In the table given herewith, the most important steps of the operation are illustrated.

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DESCRIPTION OF A NEW PROPTOMETER

BY

J. R. MUTCH, M.D., D.O.M.S.

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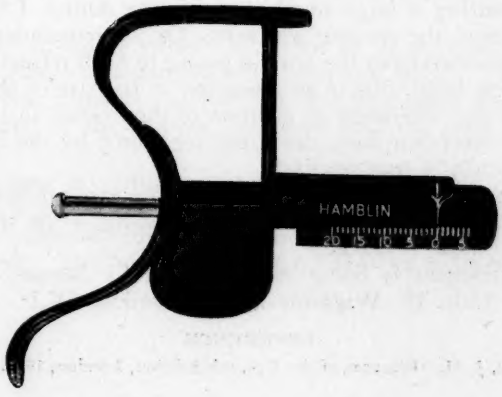
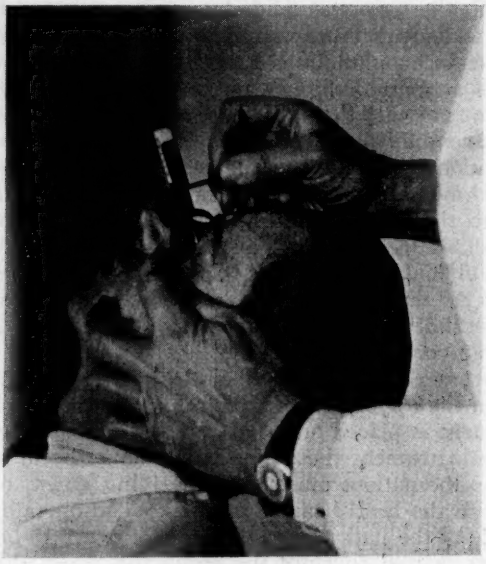
ALL physicians and surgeons who have had to examine and treat cases of exophthalmic goitre, are aware how difficult it is to state definitely whether or not exophthalmos is present, and how unconvincing a statement " the exophthalmos decreased after operation " or " the exophthalmos varied from day to day " can be, without the support of figures obtained by actual measurement. Up to the present the instrument available, besides being expensive and difficult to use, is in practice too alarming to this class of patient. For some time I have experimented with an instrument which I have found to be very simple to use and not alarming to the patient, and which will indicate, beyond any doubt, whether the proptosis is progressing or regressing.

The first difficulty to overcome was to find a fixed point or points from which the measurements could be obtained, and after a good deal of experimenting the orbital margins above and below the centre of the cornea were chosen.

The instrument consists of a small metal stand with a central plunger, on the upper part of which is a millimetre scale. When the instrument is placed on a flat surface the scale registers zero. To use the instrument the patient's face must be in a horizontal position, so the patient must either be lying down, or sitting in a chair, with the head bent backwards. The operator stands on the left side of the patient irrespective of the eye to be measured. The patient is told to close the eyes, and direct them straight ahead, *e.g.*, towards the ceiling. The highest point of the cornea as seen through the closed upper eyelid is then noted, and the plunger of the instrument allowed to rest upon it. The feet of the



instrument are then allowed to drop until the longer rests on the lower orbital margin, and the shorter on the upper orbital margin. Care has to be taken that the upper projection is resting flat on the bone; in the majority of cases this can be attained only by tilting the instrument a little outwards. Any exophthalmos or enophthalmos present can now be ascertained by reading the scale. Parsons (1938) states " The normal position



of the eye is such that a straight-edge applied vertically to the middle of the upper and lower margins of the orbit just touches the closed lids over the apex of the cornea."

By measuring a large number of healthy adults, I found that in 90 per cent. the reading was zero. Of the remainder a certain proportion varied from the normal owing to high refractive errors, the variation being due to an alteration in the size of the eyeball, and not to any alteration of position of the eyeball in the socket. With this exception then, the figure registered by the instrument is anatomically a true reading.

It is suggested that + be used to indicate exophthalmos and - enophthalmos, and to facilitate quick reading + on the scale is painted red and - black.

The instrument is being manufactured by Messrs. Theodore Hamblin, Ltd., 15, Wigmore Street, London, W.1.

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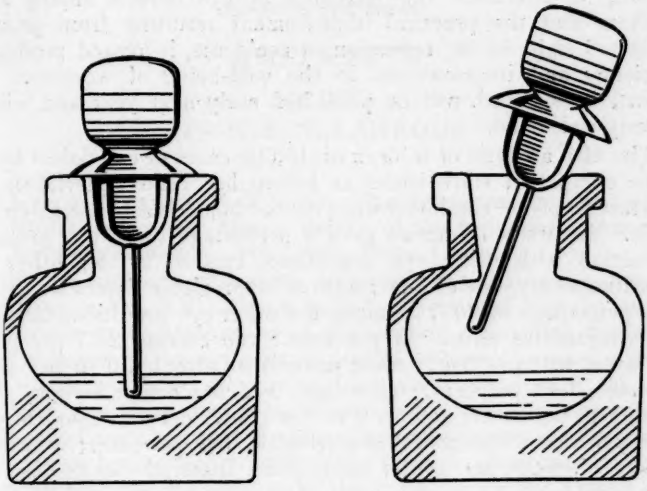
A BOTTLE AND DROPPER FOR OILY ESERINE

BY

J. FOSTER

LEEDS

THIS bottle was originally produced because I had to insert eserine in the eyes of so many patients, in a semi-dark room. The top and the glass rods of an ordinary eserine bottle were always getting mislaid or broken in the semi-darkness, and it was impossible to dispense with a top as the bottle got so dusty.



The present bottle (which is shown in its natural size in the diagram) has a stopper made of stainless steel. This was so designed that if put in obliquely, it falls into place, and the overhanging rim of the stopper dispenses with the need for a dust cover.

The stopper is virtually unbreakable, easily held, and if the solution is kept at the proper level, there is enough oily eserine on the surface when withdrawn to form one or two drops for insertion into the eye. The bottle is made by Thackray & Sons, Leeds.

ANNOTATIONS

National Ophthalmic Treatment Board. Annual Report, 1938-39.

The annual report of the National Ophthalmic Treatment Board for last year follows the customary lines. The work of the Board is dealt with under three main headings, viz., Investigation, Education, and the origin and development of the National Eye Service.

A comprehensive survey is in progress by the Industrial Health Research Board of the Privy Council in co-operation with the Board, to determine the incidence of eye defects among adult workers and the practical improvement resulting from properly corrected sight in the reduction of accidents, increased productive efficiency and improvement in the well-being of workers. The report, it is hoped, will be published early next year and will be eagerly welcomed.

The fifth analysis of a block of 10,000 cases of eye defect by the same competent statisticians as before has been undertaken and the results of the combined five years of 50,000 cases are given in a table. Errors of refraction gave a percentage of 63 65; errors of refraction with other eye conditions, one of 27·68; other eye conditions only, one of 7·90; and no appreciable defect was found in a percentage of 0·77. Among the other eye conditions tabulated the conjunctiva gave 7·33 per cent.; the cornea, 2·25 per cent.; the uvea, 4·02 per cent.; optic neuritis or atrophy, 0·96 per cent.; cataract, 7·43 per cent.; glaucoma, 0·75 per cent.; myopia above 5 D., 3·18 per cent.; squint, 6·46 per cent.; constitutional disease, 4·48 per cent.; bad conditions of work, 0·47 per cent.; injuries or effects of, 0·99 per cent.; and other material conditions, 3·61 per cent.

Employers of labour should consider these returns with care: the low proportion of bad condition of work, and that of injuries or their effects is noticeable. We hope that future years will show even a further decline.

It is most satisfactory to learn that there is no longer any popular prejudice against spectacles.

As in past years films have been much used for educational propaganda: "Eyes Right" was issued early in 1938 and has had a very successful run.

The final paragraph of the report shows the enormous growth of the National Eye Service. In its first year it dealt with 6,000

patients, to-day the annual number exceeds 150,000. These figures speak for themselves and are a matter for congratulation for all concerned.

Arrangements during the War: Preliminary Notice

The management of the *British Journal of Ophthalmology* hopes to be able to publish 48 page numbers till the end of this year in order to complete the XXIIIrd volume. It has been decided to discontinue the section on contemporary ophthalmic literature and drastically to curtail the abstract section.

We hope to give a note on future policy in the December issue.

ABSTRACTS

I.—MISCELLANEOUS

(1) **Lyons, Maxwell F. (Cairo).—The biomicroscopy of spring catarrh.** Twelfth Annual Report of the Memorial Ophthalmic Laboratory, Egypt. Schindler's Press, Cairo.

(1) An abstract of **Lyons** previous work on spring catarrh was given in Vol. XXII, No. 9, p. 563. He stated that the lesions are not due to a proliferation of pre existing connective tissue but to an invasion of the normal conjunctiva by new fibrinous material and wandering cells, originating from the capillaries of the conjunctiva; that there must be an intangible and indefinite abnormality of the capillaries, and that the lesions are merely local manifestations of a general bodily departure from the normal. The process is the same whether the disease attacks the palpebral or the bulbar conjunctiva, and the form each lesion takes depends on the structural characteristics of the site involved and the degree of capillary leakage.

This disease is always bilateral and usually symmetrical. It may begin in any part of the vascularized subepithelial tissues of the lid or globe, either from the vessels normally present in the episcleral tissue or from new vessels such as those of trachomatous pannus. This may be one of the chief reasons for the frequency and severity of spring catarrh in trachoma-infested countries.

If the conjunctiva is wiped with a swab and immediately examined under magnification, tiny droplets like dew are seen to exude through the epithelium. They grow in size and coalesce to form a film over the tarsal conjunctiva. As soon as one film is removed another

forms since the conjunctiva is so firmly adherent to the tarsus that it cannot expand rapidly enough to accommodate all the fibrinous material which is constantly exuding from the capillaries. This exudate is forced out between the epithelial cells to form the membrane, some of it, however, balloons up the epithelium to form broad papillae, which, from mutual pressure become polygonal in shape. New vessels grow into each papilla appearing beneath the epithelium as minute branching twigs. The palpebral form of the disease may absorb between active periods as does the bulbar form, the conjunctiva becoming smooth and flat. Greyish-white lines represent the inter-pupillary attachment of the epithelium to the tarsus. When organization of the exudate has taken place a fine reticulum of intersecting cicatricial fibres results. This can usually be distinguished from the cicatrization of trachoma by its greater regularity.

The lesion of spring catarrh in its simplest form occurs in the interpalpebral zone of the bulbar conjunctiva. Owing to the looseness of the conjunctiva here and the lack of support from the lids little resistance is offered to leakage from the capillaries, which according to the author is the important factor of the disease. The earliest signs are a dilatation of the superficial vessels with slight chemosis. As the exudation increases a mass is formed, which may attain a considerable size within a couple of months; and this may fade away rapidly during the winter months.

When the leakage is from the zones of vascular loops, and end-capillary loops, a narrow gelatinous ring develops, round the cornea.

When the new vessels of trachomatous pannus begin to leak an extension of the pathological change to the cornea must occur. An irregular ring of confluent nodules develops around the limbus, causing an apparent diminution of the corneal diameter.

All forms of spring catarrh are characterized by an increase in the pigmentation of the epithelium, chiefly around the limbus.

The author states that primary involvement of the cornea by spring catarrh occasionally occurs when trachomatous pannus is present.

In the early stage of the palpebral form of spring catarrh one can detect the formation of the typical membrane which, being composed of fibrin, and eosinophils is pathognomonic of the disease.

The first detailed account of spring catarrh in Egypt was given by Meyerhof (*Klin. Monatsbl. f. Augenheilk.*, June, 1912, and *Bull. Soc. d'Ophtal. d'Egypte*, 1912) in which he pointed out that the first recognition of the disease was by MacCallan who reported this in *The Ophthalmoscope*, Nov.-Dec., 1908, and *Ophthalmic Record*, Dec., 1910. From this resulted the designation of a special group of cases, trachoma complicated by spring catarrh, "trachoma stage IIb" in MacCallan's classification of trachoma.

Meyerhof showed that there was a hereditary factor in spring

catarrh, and he also remarked on its occasional unilateral occurrence. The latter phenomenon had previously been noted by Axenfeld (*Bull. Soc. Française d'Ophtal.*, 1907).

A. F. MACCALLAN.

(2) **Kukán, F. (Pécs).—Closure of the angle of the anterior chamber by negative pressure. (Verschliessung des Kammerwinkels durch negativen Druck).** *Klin. Monatsbl. f. Augenheilk.*, Vol. C, p. 68, 1938.

(2) **Kukan** describes some interesting experiments on the effect of negative external pressure on intra-ocular tension. The application of a pressure cup fitting round the limbus, with a negative pressure of 150 mm. exerted for three minutes, causes little alteration in the intra-ocular pressure, whereas a wider cup which extends on to the sclera causes a marked fall. If "scleral" pressure is applied after "corneal" no such fall occurs and the author attributes this to a closure of the anterior angle caused by negative pressure acting at the limbus. In "scleral" pressure the angle probably remains open and free drainage is maintained.

D. R. CAMPBELL.

(3) **Lindahl, J. (Osterund).—Two cases of transient myopia. (Zwei Falle von transitorischer Myopia).** *Acta Ophthal.*, Vol. XVI, p. 344, 1938.

(3) **Lindahl** reports two patients in whom myopia of a considerable degree had developed during the course of acute disease and disappeared rapidly. One patient was a man, aged 20 years, suffering from acute nephritis with mild oedema. At the height of the disease his refraction was R. −8, L. −9. On the subsidence of the nephritis after twelve days the patient became emmetropic. The second case concerns a woman, aged 39 years, suffering from acute polyarthritis. She was given massive doses of salicylates. Six days after inception of salicylate treatment she showed 5 D. of myopia and four days after cessation she was emmetropic. The author stresses the heavy perspiration that this patient underwent and discusses the possibility of the myopia being due to changes in the sodium chloride concentration of the body fluids, as it is held to be in the transient myopia in diabetes.

ARNOLD SORSBY.

(4) **Lodberg, C. V. (Viborn).—Congenital absence of abduction. (Absence congenitale de l'abduction).** *Acta Ophthal.*, Vol. XV, p. 247, 1937.

(4) **Lodberg** reports seven cases of congenital absence of abduction and gives an exhaustive survey of the literature on the

subject, together with a detailed analysis of the symptoms. He stresses the following ten aspects:—

(1) absence of abduction in one or both eyes;
(2) association with some limitation of adduction;
(3) retraction of globe is present in 50 per cent. to 70 per cent.; when present this is a characteristic feature; in some cases there is a difference of 10 mm.;
(4) narrowing of palpebral fissure with sinking in of the upper lid;
(5) elevation (sometimes depression) of globe on adduction;
(6) enophthalmos (rare);
(7) protrusio bulbi with widening of fissure on abduction;
(8) in two cases there was a difference in the degree of movement when the patient was examined for each eye separately and binocularly;
(9) torticollis;
(10) disturbances of vertical movement.

The author found the ratio of affected women to men to be 6:4; the left eye was involved in 75 per cent. of cases. As regards operative treatment he draws attention to the danger of perforating the sclera which in these cases is thin.

ARNOLD SORSBY.

(5) **Kentgens, S. K. (Utrecht).—The relationship of pregnancy, disorders of dark adaptation and the vitamin A content of the blood. (Ueber den zusammenhang von schwangerschaft, störung der dunkeladaptation und dem Vitamin A-gehalt des Blutes).** *Acta Ophthal.*, Vol. XVI, p. 332, 1938.

(5) **Kentgens** determined the vitamin A content of the blood by the colorimetric method of Wolff in nineteen patients in the last month of pregnancy. None of them were night-blind, though ten showed slightly lowered dark adaptation. Of these ten two had a normal and eight a lowered vitamin A content. Of the nine that had no disturbance in dark adaptation four showed a slight lowering of the vitamin A concentration. Twenty-four control cases showed that anomalies and dark adaptation were more frequent in pregnancy, but the presumption that these anomalies were dependent on a lowered vitamin A concentration could not be verified. Administration of vitamin A increased the sense of dark adaptation even in those cases where the vitamin A content was normal. There was, therefore, no quantitative relationship. The author concludes that disturbances in dark adaptation are not an early symptom of a vitamin A deficiency. These disturbances only come into play when the body has used up its storage of vitamin A.

ARNOLD SORSBY.

(6) **Aron, F. and Zeeman, W. P. C. (Amsterdam).—Atypical coloboma and spontaneous cyst of the iris. (Atypisches Kolobom und Spontane Iriscyste).** *Acta Ophthal.*, Vol. XVI, p. 380, 1938.

(6) **Aron** and **Zeeman** give the clinical and histological details of pseudoglioma observed in a girl aged six months. The family history was clear. Histologically the pseudoglioma was found to consist of a cyst of the iris situated between the stroma and the posterior leaf of the iris. The lens was displaced backwards. The wall of the cyst was covered with epithelium growing from the iris and ciliary body. There was a narrow fissure in the pigment layer of the iris. They hold that the cyst arose from an atypical coloboma of the iris and that it originated from the secondary optic vesicle, thus making it analogous to an orbital cyst in colobomatous eyes.

ARNOLD SORSBY.

(7) **Licheri (Modena).—A rare case of exophthalmos. (Un raro caso di esoftalmo).** *Arch. di Ottal.*, January, 1939.

(7) The patient in this case had suffered from migraine for many years. After an attack of the usual kind he suddenly experienced intense pain in the left orbit, with a sensation of heat and heaviness in the left eye; he noticed that the eye protruded. Shortly after he noted diplopia. On examination, the eye was seen to be protruded downwards and outwards; there was marked ptosis and limitation of movement in all directions. The skin was not red or oedematous. After some days an exploratory puncture was made and a quantity of turbid red-brown fluid was withdrawn; the eye went back into place, the ptosis disappeared and movements became normal. There seems no doubt that in this case there was a sudden haemorrhage into the orbital tissue. This usually depends on some general disease, weakening the vessels; but all disease of this nature seems absent here. **Licheri** imagines that the long-standing recurrent migraine was followed by some disturbance of the vascular system.

HAROLD GRIMSDALE.

(8) **Fontana (Modena).—The reaction of the ocular tissues towards bronze and aluminium. (Comportamento dei tessuti dell'occhio in presenza di scheggi metalliche endobulbari).** *Rass. Ital. d'Ocul.*, Nov.-Dec., 1938.

(8) Though the behaviour of the eye to copper is well known, not much is known of the reaction to bronze and still less of that to aluminium. **Fontana** has made experiments on rabbits, putting fragments and filings of these metals into the anterior chamber of the eye and masses into the vitreous. He finds that the introduction

of bronze is followed by serious reaction similar to that of copper; this might have been expected since bronze is an alloy of copper and tin. Aluminium, on the other hand, is well borne and gives rise to no important disturbance.

HAROLD GRIMSDALE.

(9) **Bertoldi (Turin).—A case of heterochromia iridis complicated by cyclitis and cataract. (Aproposito di un case di eterocromia dell'iride complicato da ciclite e cataratta).** *Rass. Ital. d'Ottal.*, Nov.-Dec., 1938.

(9) The patient, the subject of this note, has always found his left eye the better until recently; the right had a small paracentral macula of the cornea. The pupil and the palpebral fissure were slightly smaller than on the left side. The left eye showed many points of fine K.P.; and the left lens showed commencing cataract. The general examination revealed early tuberculosis. **Bertoldi** calls attention to certain points in the condition of the eye; there was slight enlargement of the pupil and of the palpebral fissure; the latter symptom increased after the instillation of cocaine. It seems probable that this showed increased action of the sympathetic. The low intra-ocular tension may have been due also to this.

HAROLD GRIMSDALE.

(10) **Antoniotti (Turin).—The pupil in appendicitis. Il comportamento della pupilla negli ammalati di appendicite).** *Rass. Ital. d'Ottal.*, Nov.-Dec., 1938.

(10) It is never easy to diagnose chronic appendicitis with certainty. Any symptom which helps in this, is therefore very important. It has been stated that the right pupil generally is larger than the left in these patients. **Antoniotti** gives details of the pupils in 100 cases. He finds that in low light the right pupil is definitely the larger in 50 cases; he finds, further, that a weak solution of cocaine, 0·25 per cent., produced mydriasis, greater in the right eye; pilocarpine in solution 1 in 3,500 produced constriction of the pupils but the left was more constricted than the right. The cases seen, included acute appendicitis; 63 were chronic. Fifty of these showed the symptom, nearly 80 per cent. The mechanism of the reaction seems to be connected with the very rich nervous plexus over the appendix, which is irritated by any inflammatory process.

HAROLD GRIMSDALE.

II.—MEDICAL

(1) **Stallard, H. B. and Tait, C. B. V. (London). — Boeck's sarcoidosis.** *The Lancet*, February 25, 1939.

(1) **Stallard** and **Tait** record a case of Boeck's sarcoidosis in a female patient aged 44 years. Signs showed themselves first in 1932 when a painless lump was noted in the right breast. Glands were present in the axilla of the same side and in the anterior and posterior triangles of the neck on the opposite side. Later in the year the growth in the breast and one of the glands in the posterior triangle were excised and showed the structure of sarcoid tissue.

In 1933 the patient was under treatment for irido-cyclitis of both eyes. A year later chronic uveitis, secondary cataract and a lowered intra-ocular pressure were noted, together with bilateral effusion into the knee joints. In early 1935 vision was reduced to perception of light; the irido-cyclitis was of the plastic variety and iris bombé was present in the right eye. The intra-ocular pressure was now raised on both sides. A left-sided iridectomy was performed but the coloboma gradually became occluded by fresh exudate.

Radiograms suggested healed sarcoidosis lesions in the right lung, but other investigations were negative.

Early in 1936 the left eye was soft and atrophic. There was keratitis in the right eye with ring staining and vascularisation of the cornea. The patient now had the classical features of myxoedema.

At the present time the left eye is shrunken and blind; in the right eye the tension is low and projection of light is inaccurate.

The paper is illustrated with photos of the present general condition together with microphotographs of tissue from the breast and axillary gland.

R. R. J.

(2) **Sorsby, Arnold, Avery, Harold and Cockayne, E. A.—Obesity, hypogenitalism, mental retardation, polydactyly and retinal pigmentation. The Laurence-Moon-Biedl syndrome.** *Quarterly Jl. of Med.*, New Series, Vol. VIII, No. 29, January, 1939.

(2) **Sorsby, Avery** and **Cockayne** here present a paper which is complementary to that in the same journal by Cockayne, Krestin and Sorsby, which was noticed in our pages, Vol. XIX, p. 530. The previous paper analysed 101 cases from the literature up to 1935. The present report is on two families and includes an analysis of the many articles that have appeared in the past four years.

The two new familial groups reported in this paper are Jewish, in both cases the parents are first cousins and are normal.

In the "G." family there were five pregnancies which went to full term, the children all being boys. The eldest is alive and normal. The second died, aged 23 years, from pneumonia. He was an inmate of a mental hospital and showed all the typical features of the syndrome. The next two boys died aged 10 years and 4½ years respectively. No definite facts were forthcoming about them. The youngest boy is now 17 years old, obese, mentally deficient and certified blind. Extra digits were removed from the hands in infancy. There is fleshy syndactyly in both feet; the left foot shows fusion of the 4th and 5th digits and in both feet there is fusion of the proximal parts of the second and third toes. Radiography shows no bony abnormality of hands or feet. The fundi show atypical retinitis pigmentosa with optic atrophy and gross pigmentation. The testes are undescended, the penis small and there is marked flat foot.

In the "M." family there were eleven pregnancies, two ending in miscarriage; of the living children only one was a boy. The eldest child died at three weeks. The youngest daughter and the boy, her immediate senior, are the only members affected.

The boy is 21 years old. When eight years old he was under the care of Mr. R. C. Davenport and was at that time a very obese child. For the past four years he has been distinctly lean. He is mentally defective and unemployable. There is no distinct hypogenitalism and no skeletal abnormalities apart from scoliosis: small fleshy excrescences are present on the ulnar aspect of each hand. There is marked nystagmus with much retinal atrophy with narrow arteries; pigmentary changes are absent, though the maculae suggest dystrophic changes. The girl is 19 years of age, stout but not grossly obese. She is defective and unemployable. Her fundi show the same changes as those of her brother; there is an extra finger on the ulnar side of the right hand. Menstruation appears to be normal.

These cases were shown at the Royal Society of Medicine, Section of Ophthalmology, in December, 1936, by Avery and Sorsby.

The rest of the present paper gives a review of recent literature, the components of the syndrome, post-mortem findings in three cases and a discussion. Case reports show the frequent occurrence of one or more components of the syndrome in the ascendants of patients showing the full syndrome. "No case of the inheritance of the full syndrome is known, though cases are reported indicating that patients exhibiting the syndrome are not sterile."

The condition is not confined to the Caucasian race. Available post-mortem records have not shown any characteristic lesions. Attention is here drawn to a series of allied conditions. "It is suggested that the syndrome is determined by two recessive genes

in the same chromosome, or that it is dependent on some chromosome error such as dislocation or translocation."

Two pages of bibliography complete a paper, reported with the thoroughness we are accustomed to in the authors, which is a model of what a paper should be.

R. R. J.

(3) **Valerio (Milan).—A rare case of Gunn's phenomenon. Su di un caso raro di fenomeno di Marcus Gunn).** *Riv. Oto.-Neuro. Oftal.*, December, 1938.

(3) The case recorded by **Valerio** is unusual in that the condition either began or was noticed to be more marked at the age of 18 years. There are a few cases in which the phenomenon is said to have been acquired, but for the most part, they have shown as in this case, a slight ptosis which increased. The chief interest in the paper is the discussion on the recent theories concerning the nature of the phenomenon. The first step, the author says, in the explanation was made by Grant, who noted that after instilling homatropine into both eyes in a case of this kind, the associated movement ceased. It is interesting to note that Gunn in his first case, used homatropine to both eyes and records a variation in the size of the pupils, but it is certain that no change in the movement could escape so careful an observer. Grant, having seen that elevation of the upper lid followed only on movement of the jaw to the left, thought that by abolishing this movement, he might benefit the patient, and determined to divide the motor branch of the fifth nerve. This he did with satisfaction to the patient. Lewy and Groff have investigated the phenomenon; they conclude that it is a form of pseudomotor movement, of the type of Heidenhain and Sherringham. They find that after dividing intra-cranially the oculo-motor nerve in a cat, an injection of acetyl choline was followed by great dilatation of the palpebral fissure of the same side; a similar action follows the injection of nicotine; stimulation by faradic electricity of the peripheral stump of the first branch of the trigeminal produced a similar reaction.

Lewy, later, stimulating the anterior end of the mesencephalic nucleus of the fifth nerve, after the division of the oculo-motor, obtained elevation of the upper lid. The nucleus seemed therefore to have an important part in the production of this phenomenon.

In the author's case, he wished to divide the motor branch of the fifth nerve but the patient refused; he eventually fixed the upper lid to the scleral insertion of the superior rectus; this from the patient's point of view, was entirely successful, the associated movement and the ptosis being less obvious.

HAROLD GRIMSDALE.

(4) **Schutzbach, M. (Halle).—A case of severe malformation involving especially the skull and face. (Ueber einen Fall von schwerer Missbildung, insbesondere des Schädels und des Gesichtsskeletts).** *Zeitschr. f. Augenheilk.*, Vol. XCIV, p. 131, 1938.

(4) **Schutzbach** reports a case showing some of the features of the Crouzon syndrome. The orbits were small and the eyes were not covered by the eyelids. The cornea was opaque and ultimately perforated. The child died at the age of five months. The family history showed the presence of the following affections:—polydactyly, endothelial dystrophy, mental deficiency, cretinism and parenchymatous keratitis.

ARNOLD SORSBY.

(5) **Böck, J. (Vienna).—Clinical and anatomical aspects of angeoid streaks. (Zur Klinik und Anatomie der gefäkähnlichen Streifen im Augenhintergrund).** *Zeitschr. f. Augenheilk.*, Vol. XCV, p. 1, 1938.

(5) **Böck** gives a detailed account of seven cases of angeoid streaks with pseudoxanthoma elasticum, together with an exhaustive review of the literature on the subject. Of special interest is the post-mortem report of one of the patients who died at the age of 44 years from vascular hypertension. Extensive changes were found in the elastic tissue of the aorta, the bigger systemic vessels and the choroidal vessels. The author concludes that the appearance of angeoid streaks is due to ruptures in the elastic membrane of Bruch—a condition he demonstrates histologically—and holds that in addition to the skin and eye changes there must now be added a third feature: degeneration of elastic tissues throughout the body. He suggests the name of elastosis dystrophica for this syndrome.

ARNOLD SORSBY.

(6) **Freusberg, O. (Hamburg-Eppendorf).—Semi-homonymous papilloedema in partial optic atrophy due to a unilateral tract lesion. (Halbteilige homonyme Stauungspapille bei partialler Optikus atrophie nach ein-seitiger Traktuslasion).** *Klin. Monatsbl. f. Augenheilk.*, Vol. CI, p. 494, 1938.

(6) **Freusberg** gives the full history of a malignant glioma in the right frontal-parietal region which involved the optic tract and lateral geniculate body. Before operation there was right-sided papilloedema, and later slight optic atrophy in both eyes and left homonymous hemianopia—a condition which persisted for several years. In the terminal stages papilloedema again developed on the nasal side of the right disc—a change which is rarely seen. A full histological investigation of the brain showed the exact site of the affected tracts, while the optic nerve showed that only the functioning fibres were swollen, while the atrophied fibres on the temporal side did not take part in the papilloedema.

D. R. CAMPBELL.

III.—THERAPEUTICS

(1) **Douthwaite, A. H. (London). — Recent developments in modern chemotherapy.** *The Practitioner*, June, 1939, pp. 729-736.

(1) This article is of value in clearing up any natural confusion in the nomenclature of certain drugs used in chemotherapy.

The term sulphonamide is a generic one and embraces all the drugs mentioned subsequently. The name sulphanilamide, on the other hand, denotes one substance, and one substance only, no matter what other titles it may bear; these trade titles are prontosil album, sulphonamide-P, consulanyde, prontylin and streptocide. It is p-amido-benzene-sulphonamide.

The most remarkable of the sulphonamides in respect of therapeutic activity is M and B 693 which is sulphanilyl-amino-pyridine which is especially efficacious against the pneumococcus and the gonococcus.

Proseptasine and soluseptasine are benzyl derivatives of sulphanilamide.

Other sulphonamides are prontosil rubrum, prontosil soluble, rubiazol and uleron.

Choice of drug. Sulphanilamide and M and B 693 are equally valuable for β-haemolytic streptococci; but in pneumonia and gonococcal infections the latter is to be preferred.

Dosage. It should be borne in mind constantly that the sulphonamides if they are to do good, will do so in a few days. They are rapidly absorbed (they can be found in the eye of a dog within 15 minutes of injection) and rapidly excreted, so the doses should be spread as evenly as possible over the 24 hours. M and B 693 may be given in two gramme doses (that is four tablets) every four hours for three doses; then 1 gramme every four hours for two days; then 0·5 gramme every four hours for one day; and finally 0·5 gramme thrice daily for two or three days. This dosage of 24 or 27 grammes is considered sufficient for acute diseases such as pneumonia. When chemotherapy has been applied in chronic diseases such as trachoma the number of grammes given over a period of a fortnight has been about double this. Such treatment for trachoma is highly empirical. We believe that trachoma is a disease of virus origin, and there is as yet very little evidence that sulphonamide compounds have any effect on virus diseases.

Toxic effects. Mental depression and lassitude are usual. Pyrexia is sometimes caused. Vomiting is not infrequent, whether of central or of local origin is not certain. More serious are cyanosis, methaemoglobinuria, and reduction in the number of polymorphonuclear leucocytes. In severe cases of cyanosis blood transfusion is indicated.

Incompatibles. The following articles should be prohibited during chemotherapy:—All purgatives (paraffin not being a purgative is permitted to combat constipation), eggs (because of high sulphur content which might lead to the production of sulphaemoglobin), and phenacetin.

Toxic effects may be minimized by powdering the tablets and adding an equal quantity of sodium bicarbonate, or as the author suggests giving five minims of tincture of opium half-an-hour before each dose.

Conclusion. In conclusion the author gives a warning against the employment of any of these drugs as a "shot in the dark" for cryptic fever, or for the treatment of every case of sore throat, coryza, influenza and a host of other diseases. The danger of granulocytopenia, though not great, is nevertheless present, and only justifiably incurred in the face of greater and commoner hazards. There is no evidence that the sulphonamides influence the course of the common cold, influenza, or the typhoid group of infections except by increasing prostration and delaying recovery.

A. F. MACCALLAN.

(2) **Marshall, Jr., E. K. (Johns Hopkins University).—Bacterial Chemotherapy, the pharmacology of sulphanilamide.** *Physiological Reviews,* Vol. XIX, No. 2, 1939.

(2) The idea of developing specific chemical substances for the treatment of bacterial infections is as old as bacteriology itself. In 1881 Koch failed to cure anthrax with mercuric salts, and he and others found their experiments discouraging. However, in 1904 with Ehrlich's success with protozoan infections the search for drugs of chemotherapeutic value began again, but it has been only in the last few years that by haphazard trial and error that the value of the sulphonamide group of drugs was discovered. In 1908 Gelmo described the preparation of sulphanilamide in a purely scientific paper. By the substitution of various molecules he discovered different compounds, including dyes. In 1932 Domagk using a compound patented for dyeing cured streptococcal infections in mice; this was sold as prontosil.

In a study of the pharmacology of any therapeutic agent three lines of investigation are important: namely, the effect of the drug on the infecting organism *in vivo* in animals, the effect of the drug on the infecting organism *in vitro* under various conditions, and the effect of the drug on the host.

An interesting and important observation from the standpoint of the mechanism of action of these drugs is the fact that treated mice may die from streptococcal septicaemia a long time after treatment has ceased and without showing any symptoms in the interval.

In the virus diseases studied sulphanilamide as well as prontosil and prontosil soluble have in the main given completely negative results. However, it has been shown by MacCallan and Findlay (*Lancet*, Vol. II, p. 136, 1938) that the treatment of mice infected intracerebrally with the virus of lymphogranuloma inguinale by sulphanilamide and by a glucose derivative of 4 : 4¹—diaminodiphenylsulphone gives these compounds the power of protecting a considerable percentage of mice against active strains of the virus.

The drug diffuses readily to all tissues and fluids of the body, which is one of the factors which make the substance a successful chemotherapeutic agent.

So far all these newer compounds which have been shown to be active against bacterial infections contain sulphur. It has been demonstrated, however, that the sulphonamide group is not necessary for activity.

It seems that the balance of evidence indicates that sulphanilamide affects the invading organism in the sense of producing a bacteriostatic or bactericidal action which in many cases is not sufficient to effect sterilization without the co-operation of the defensive reaction of the host.

A. F. MACCALLAN.

(3) **Wheeler, J. N. (New York).—Spastic entropion correction by orbicularis transplantation.** *Trans. Amer. Ophthal. Soc.*, Vol. XXXVI, p. 157, 1938.

(3) **Wheeler** reviews the operative procedure for the correction of spastic entropion and comments on the recurrence of this disorder in spite of surgical attention. He describes two operations which have the advantage of producing a permanent effect and of affording support to the lower lid. In neither operation is any skin or muscle sacrificed.

(i) A skin incision is made 6 mm. below the lower lid margin beginning to the nasal side of the centre of the lower lid and carried in a line parallel with the lower lid margin outwards to a point 1 cm. beyond the orbital margin. The skin is dissected from the orbicularis muscle. Over the lower border of the tarsal plate a strip of orbicularis muscle 4 mm. wide is dissected up and divided at the orbital margin on the temporal side, the nasal end is left attached. An incision is then made in the orbicularis muscle and carried from the temporal extremity of the orbicularis strip outwards and slightly upwards to the limit of the skin incision and down to the periosteum covering the malar bone, which is then exposed by retracting the cut edges of the orbicularis muscles. The strip of orbicularis muscle is then carried outwards and slightly upwards and made taut over the malar bone, of which it is sutured to the periosteum with 000 catgut and then wound closed with interrupted sutures.

(ii) An alternative to the above operation is as follows: A skin incision is made 5 mm. below and parallel with the lower lid margin for almost its entire length. The skin flaps are dissected to expose the orbicularis muscle. A strip of this muscle 4 mm. wide just below the lower border of the tarsus is dissected up and divided in the centre.

A 000 catgut suture is passed through the tarso-orbital fascia 2 mm. below the lower margin of the tarsus and is then carried in turn through each flap of the orbicularis strip so as to produce an overlap 4 or 5 mm. This suture is then tied and the overlap made secure by two additional sutures.

There is a tendency for over-correction to occur from this operation but the author considers that a 4 or 5 mm. overlap affords the most exact adjustment.

H. B. STALLARD.

(4) **Rosengren, B. (Gotenburg).—The treatment of retinal detachment by diathermy and injection of air into the vitreous. (Ueber die Behandlung der netzhautablösung mittelst Diathermie und Luftinjektion in den Glaskorper).** *Acta Ophthal.*, Vol. XVI, p. 3, 1938.

(4) **Rosengren** after discussing several aspects of diathermy treatment in detachment, holds that contact of the retina with its bed is essential and advocates the method first suggested by Arruga, viz., injection of air into the vitreous by means of a syringe introduced behind the ciliary body. The injection should be controlled ophthalmoscopically. In such cases where the detachment is situated in a mechanically unfavourable place, the eye may have to be pulled down by means of a suture passed through the superior rectus and through the lower lid, so that the new position enables the air to exercise its pressure most effectively. These sutures can be removed after seven to ten days. He reports fourteen successes in a series of eighteen cases treated by this method.

ARNOLD SORSBY.

(5) **Hausmann, G. (Vienna).—Report on short wave therapy in the First University Eye Clinic in Vienna. (Bericht ueber Kurzwellentherapie an der I. Universitäts-Augenklinik in Wien).** *Zeitschr. f. Augenheilk.*, Vol. XCIII, p. 213, 1937.

(5) **Hausmann** reports on the results of short-wave therapy in thirty-one cases, consisting of five showing post-operative infection, nine perforating injuries, seven chronic uveitis, six serpigenous ulcer, two herpes of the cornea and two dacryocystitis. Three of the five cases of post-operative infection, two of the perforating injuries and the four cases of herpes and dacryocystitis did well. There was no damage done in any of the others. The wave length used was three metres.

ARNOLD SORSBY.

(6) **Werdenberk, Ed. (Davos).—The fundamentals of knowledge and therapy of ocular tuberculosis. (Grundsatzlicher zur Kenntnis zur Therapie des Augentuberkulose).** *Klin. Monatsbl. f. Augenheilk.*, Vol. CI, p. 641, 1938.

(6) **Werdenberk** gives statistical results of twenty years' experience of ocular tuberculosis. He recognises three types of the disease which are well exemplified in iritis, viz., exudative, productive (nodular), and fibrous. The first is usually associated with a lack of immunity, while in the later types immunity is usually well-established. Ocular tuberculosis usually negatives the presence of thoracic infection—the latter being present in only 30 per cent. of cases. The author considers that infection spreads by the lymphatics, and draws attention to the analogous pathological changes which can occur in the lung and in the iris, *e.g.*, miliary deposits, pus formation, and adhesions. He considers tubercular dermal tests are of no real value, and that diagnosis must rest on clinical appearance and the exclusion of other forms of infection.

General treatment is most important and high altitude has a most beneficial effect. Tuberculin treatment is only effective in about 10 per cent. of cases. The author details those forms of treatment which are harmful.

D. R. CAMPBELL.

(7) **Tsopelas, B. (Berlin).—The treatment of 3 cases of occlusion of the central retinal artery with Eupaverin (Merck). (Ueber die Behandhung von 3 Fallen von Verschluss der Arteria centralis Retinae mit Eupaverin Merck).** *Klin. Monatsbl. f. Augenheilk.*, Vol. CI, p. 830, 1938.

(7) **Tsopelas** describes three cases of non-embolic occlusion of the central retinal artery, two of which showed a certain amount of recovery of vision and visual field after injections of eupaverin. This was given intravenously in doses of 2 c.c. for several days, amounting to a total of 20 c.c.

D. R. CAMPBELL.

(8) **Borioni (Rome).—Folliculin in the treatment of gonococcal conjunctivitis. (La follicolina nella terapia delle congiuntiviti gonococciche).** *Boll. d'Ocul.*, September, 1938.

(8) **Borioni** has compared this treatment with that of argyrol; he used it in one eye of bilateral cases, keeping the other as control under argyrol; he finds the results similar. He gave folliculin also by the mouth, so that perhaps the comparison is not quite fair. The cost of argyrol is much less.

HAROLD GRIMSDALE.

NOTES

Corrigendum

ON page 461 among the names of the authors of the paper on "Dark Adaptation as an index to adequate vitamin A intake," Mr. Logaras's initial should be G. not J. In addition, the word "of" has been omitted after the word "assistance" before his name.

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George Brewster and Jennie Mathews Honorarium

AN honorarium of $1,000 to promote research work in ophthalmology, is offered through the International Association for the Prevention of Blindness, the jury to consist of the Executive Committee together with the President and the Officers of the Association.

The award will be made in connection with the XVIth Concilium Ophthalmologicum. Papers may be presented by any responsible research worker. The subject is to be ***simple non-inflammatory glaucoma*** and may include anything definitely relative to the question. The matter must be new and of such value, in the judgment of the jury, as to merit this recognition. Papers may be written in English, French, German or Italian; in order to facilitate the task of the jury, papers written in the last two languages should be accompanied by a translation in English or French. They should be in the hands of the secretary of the International Association for the Prevention of Blindness, 66, Boulevard Saint-Michel, Paris, through whom they will reach the Members of the judicial Committee, not later than six months before the date of the Congress.

The decision of the jury will be final.

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North of England Ophthalmological Society

IT has been found necessary to cancel the dates of the meetings of the Society as they appeared in last month's issue. It is hoped to arrange a new list of dates later. Meanwhile it should be noted that the Manchester meeting of the Society will be held on October 21.

FUTURE ARRANGEMENTS

1939

October 6.—Midland Ophthalmological Society, at Birmingham and Midland Eye Hospital. (Annual.)

October 21.—North of England Ophthalmological Society, at Manchester.

1940

July 4-6.—Ophthalmological Congress, at Oxford.